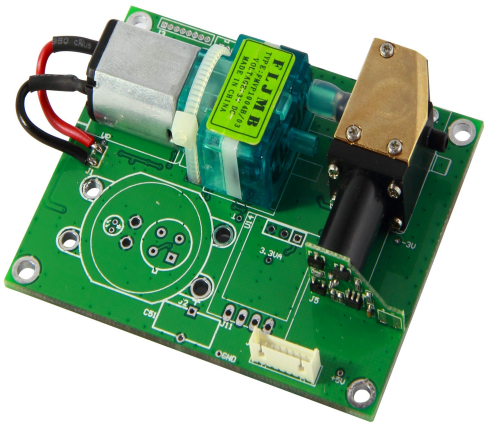
四方光电

Laser Particle Sensor Module PM2003

USER MANUAL



Ver. 1.0 2014 4

Wuhan Cubic Optoelectronics Co., Ltd

Note: The data in the picture is for reference only, and the actual delivered goods shall prevail

1. Function

The laser particle sensor module adopt the principle of laser scattering measurement to measure the quantity of different particle size (0.3 um, 2.5 um, 10um) in indoor air and it can be converted to ug/m3 according to the mathematical algorithm; The module performs stable and it's suitable for high-end air purifier , fresh air system, air conditioning system, the air quality testing instrument, consumer electronics relevant products.

2. Specification

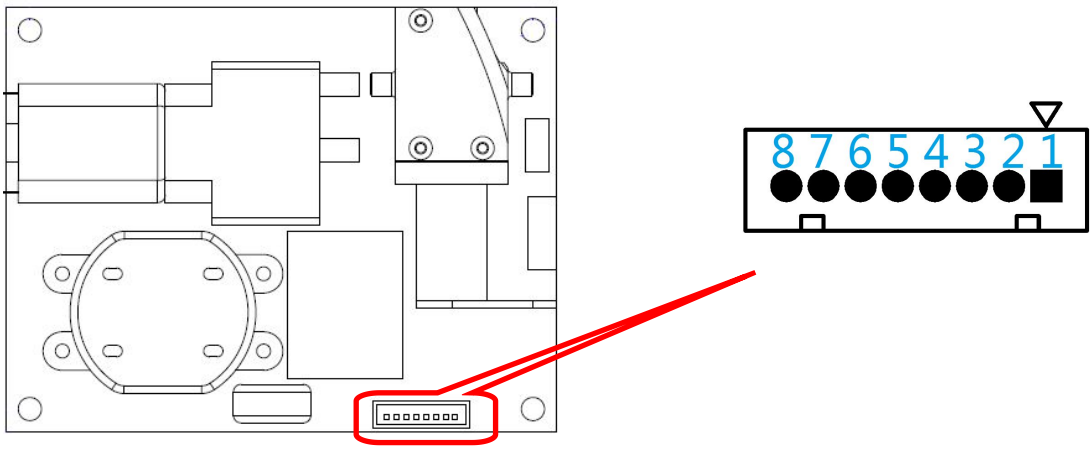
1)Basic Specification

Working Temperature	0-50℃
Stable Storage Temperature	-20 ~ 60°C
Working Humidity	0-95% RH non-condensing
Output 1	UART (0 ~ 3.3V Interface)
Output 2	I2C (0 ~ 3.3V Interface)

2)Electrical Specification

Power Supply	5.0 +/- 0.5 VDC, Ripple Current＜30mV
Average Current	Dust is not sampling < 60mA；
	Dust is sampling < 360mA
Peak Current	Dust is not sampling < 150mA；
	Dust is sampling < 500mA

3)Product Display



4) Pin Definition

No.	Definition	Description
1	NOP	N/A
2	5V	POWER SUPPLY INPUT（+5V）
3	SCL	I2C CLOCK
4	SDA	I2C DATA TERMINAL
5	GND	POWER SUPPLY INPUT（GND）
6	TX	UART（SENDING）
7	RX	UART（RECEIVING）
8	GND	POWER SUPPLY INPUT（GND）

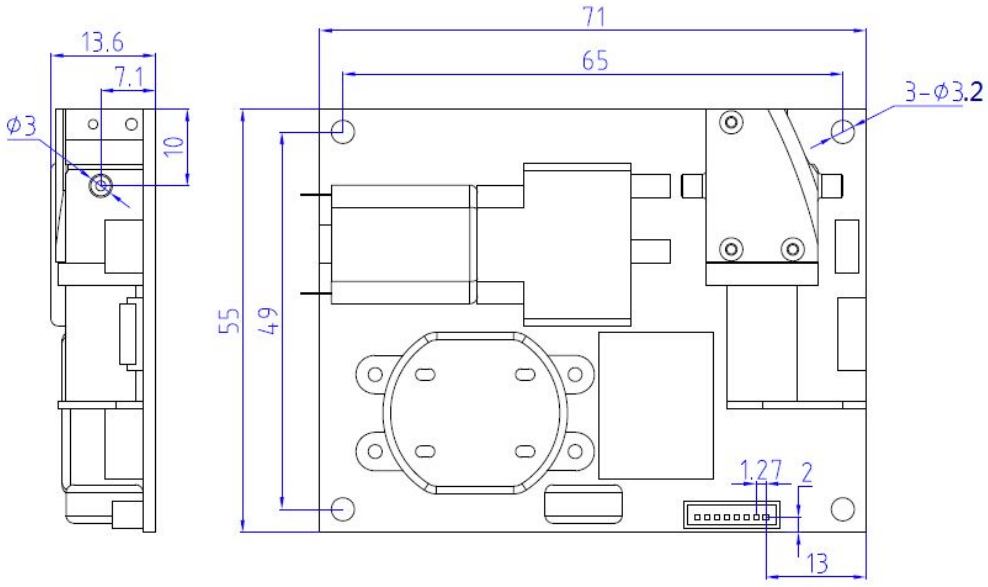
UART Interface Range
UART RX：0 ~ 3.3 V　Data Input
UART TX：0 ~ 3.3 V　Data Output

UART Configuration
Baud Rate 9600bps
No Parity Check
1 Stop Bit
No Flow Control

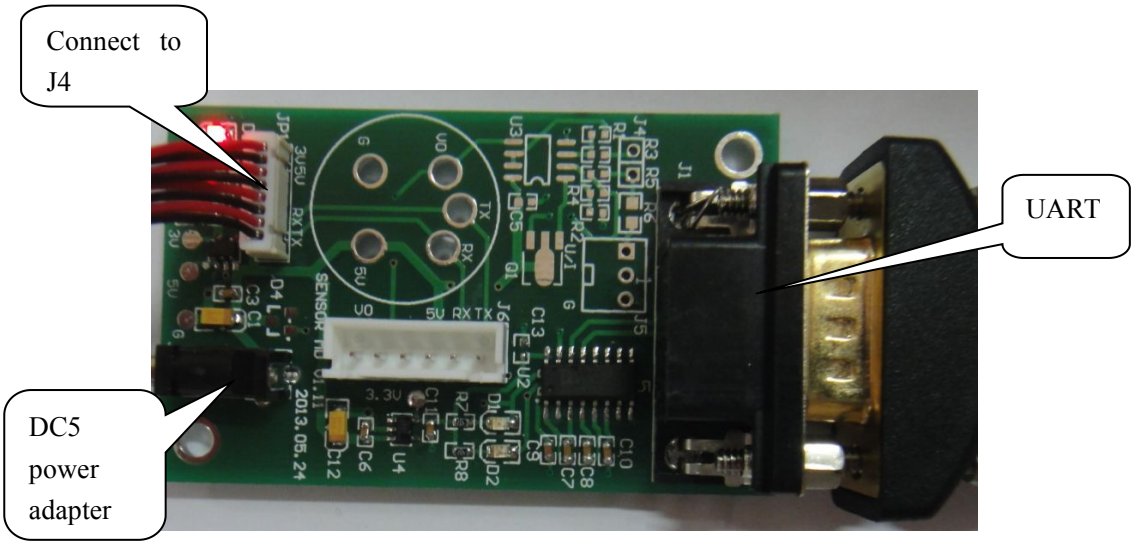
5)Measuring Specification

Measurement Principle	Semiconductor laser scattering
Measurement Particle	PM0.3, PM2.5, PM10 three channels
Measurement Range	PM2.5：0-500μg/m3 PM10：0-500μg/m3
Accuracy	PM0.3：4000particles /20% of the reading value;
	PM2.5：40particles /20% of the reading value;
	PM10： 4particles /20% of the reading value;
Sampling Method	Long life gas sampling pump
Sampling time	30s
Pre-heating Time	5s
Weight	25g
Power Consumption	360mA （pumping)
Size	71*55*13.6

3.Size(unit:mm)



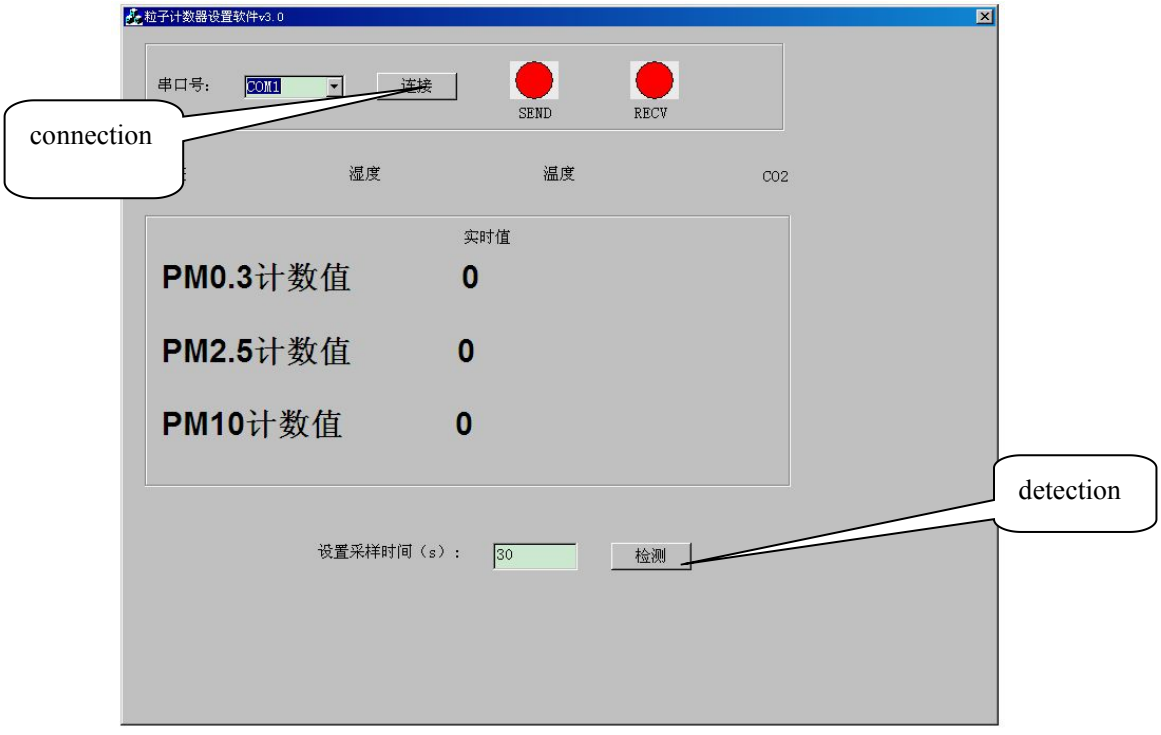
4. Work Flow



Software Instruction

Open software “particle counter V3.1.exe”， Select serial numbers， click “connection”，serial port lights turn to green from red. The serial port is connected.

Click “detection”，30s later, it shows PM0.3、PM2.5、PM10 value，Display screen is as below ：



5.Attentions

The gas sensor installation requirements ： Distance between gas sensor installation site and sampling mouth location should be as short as possible，1-3mm is suitable； The diameter of the particle sampling mouth should not less than 5mm，which equipped with mental or other no static adsorption material(ROSH) ；

The sensor module is suitable for indoor air quality testing ,so please avoid working under bad environment which contains a lot of dust; After using the the sensor, it is recommended that the sampling mouth should be closed.

6.Communication protocol

UART Communication protocol

Baud rate：9600bps
Data bit：8 Stop bit：1 Check bit：null

General Statement:

1. The data in the explanation are all hex data. Such as 46 is decimal [70]
2. [xx] is single byte data(no symbol,0-255) ;(xx) is double byte data, signed integer (-32768 to +32767),the top one is ahead. "—— " followed by explanation;
3. All the data are integer. It has (100, 10, and 1) times relationship with true data.
4. The length of the command byte is [LB]+3.

Command Format:

Send： [IP] [LB] [CMD] [DF] [CS]
[IP] address（fixed as 11）。
[LB] byte length followed does not include CS
[CMD] command
[DF] parameter items with command, optional
[CS] CS= －（IP +LB+CMD +DF）

Response：
a．When the command is implemented correctly, it responses
[ACK] [LB] [CMD] [DF] [CS]
[ACK]=0X16 right command
[LB] byte length followed does not include CS
[CMD] command
[DF] parameter items with command, optional
[CS] CS=－（ACK +LB+CMD+DF）

b．When the command is not implemented correctly, it responses
[NAK] [LB] [CMD] [EC] [CS]
[NAK]=0X06 Command is not implemented correctly
[LB]=00 02 byte length followed does not include CS
[CMD] command
[EC] the error code that command is not implemented correctly
[CS] CS= －（NAK +LB+CMD+DF）

[EC]

0x 01 Order length is wrong or wrongly analysis

0x 02 no this command

0x 03 Can't implement this command under current status

0x 04 Command can’t be implemented correctly

Function List:

NO	Function	CMD	Description
1.	Read the measuring results	0x01	
2.	Check software version	0x1E	
3.	Check equipment number	0x1F	
4.	Measure particle		
4.1.	Open/close particle measurement	0x0C	
4.2.	Read the particle measuring results	0x0B	
4.3.	Set and check measurement mode of particle	0x05	

1. Read the measuring value of VOC,CO2, temperature and humidity

Send： 11 01 01 ED

Response： [ACK] 09 01 (CO2)(VOC)(RH)(T)[CS]

Function ： Read the measuring results

identification	Data bits	Effective value range of decimalism	Responding value	Multiple
VOC	[DF3][DF4]	0 ～300	0 ～ 3.00 PPM	100
CO2	[DF5][DF6]	0 ～ 5000	0 ～ 5000 ppm	1
Temperature	[DF7][DF8]	50 ～ 990	5 ～ 99.0 %	10
Humidity	[DF9][DF10]	300 ～ 1200	-20～70℃	10

Statement：

Note： (T) is the sum of the actual measuring results and 500, that is the responding number of -20.0℃ is 300.

VOC =（DF1*256+ DF2）/100；

CO2 浓度= DF3*256+ DF4）；

湿度=（DF5*256+ DF6）/10；

温度=（DF7*256+ DF8-500）/10

2. Software version check

Send：11 01 1E D0

Response：[ACK] 09 1E [$CH1_1$] [$CH2_1$] [$CH3_1$] [$CH4_1$] [$CH5_1$] [$CH6_1$] [$CH7_1$] [$CH8_1$] [CS]

Function： to check software version
Remark：

Out put the version code. [CHx] is the vesrion number of software, that is ASCLL II code.

3. Check equipment number

Send ： 11 01 1F CF
Response ： [ACK] 0B 1F (SN11) (SN21) (SN31) (SN41) (SN51)[CS]
Function ： Check equipment number
Remark ：

1. Output is the equipment number,The range of SNx is 0~9999， the first is 2, for ex maple 0100， four integer type consist of 20 numbers.

Particle measurement

1. Open/ close particle measurement

send：11 03 0C (Time)[CS]
Response：[ACK] 01 0C [CS]
Function ： Open/ close particle measurement
Remark：

1. When the sensor receives the command, it start pump into particle measuring state. The time is 35s. 35s later it stops automatically.
2. (Time) is sampling time， the parameter is not effective, the default is 0.
3. The command is ping-pong mode. Send it again the sensor stop measuring state.

2. Read Particle measuring results

Send ： 11 01 0B [CS]
Response ： [ACK] 11 0B ($PM0.3_{H1}$) ($PM0.3_{L1}$) ($PM2.5_{H1}$) ($PM2.5_{L1}$) ($PM10_{H1}$) ($PM10_{L1}$) [CS]
Function ： Read Particle measuring results
Remark：
This command is used to read the particle measuring results($PMxx.x_{H1}$) ($PMxx.x_{L1}$)form a 32bit unsigned long integer.

3. Read particle measuring mode

Send：11 03 05 03 00[CS]
Response：[ACK] 03 05 03 DF0 [CS]
Function ： Read particle measuring mode
Remark：

1、 DF0 =0 ： Close of automatic timing particle measurement
2、DF0>=1 ： Open of automatic timing particle measurement, the value of DFO is the time of automatic timing particle measurement, unit is 10 minutes.

4. Set particle measurement mode

Send：11 03 05 06 DF0 [CS]
Response：[ACK] 01 05 [CS]
Function ： Set particle measurement mode
Remark：

2、 DF0 =0 ： Close of automatic timing particle measurement

DF0 >=1 ： Open of automatic timing particle measurement, the value of DFO is the time of automatic timing particle measurement, unit is 10 minutes.